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**We answer complex "What If ?" economic policy
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Founded in 1980, Regional Economic Models, Inc. (REMI) constructs regional and national economic forecasting models which reveal the economic and demographic impact that public policy initiatives or external events may have on a local economy.

Users of REMI economic modeling include national, regional, state and city governments, as well as universities, non-profit organizations, public utilities and private consulting firms.

Similar to but in many ways surpassing the Computable General Equilibrium (CGE) models and input-output models, our software simulations with the REMI economic model forecast economic and demographic effects of transportation policies, infrastructure investments, environmental improvements, energy and natural resource conservation programs, state and local tax changes, economic development programs, and other policy initiatives.

The widespread use of REMI's economic forecasting models in local, regional and national applications throughout the U.S. has led to extensive documentation of the value of the REMI model in socioeconomic analysis.

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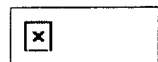
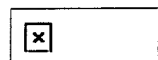
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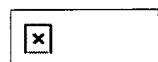


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Telephone Roundtable
An informal discussion group for those interested in modeling the economic impact of natural disasters.

MARCH 14, 16 & 21
Livable Wage Issues

Telephone Roundtable
An informal discussion group for those interested in the economic impact of minimum wage/livable wage legislation.

MARCH 27-29
Educational Seminar

Amherst, MA
An in-depth seminar on the REMI model and applications, with hands on workshops in a small group setting.

MARCH 30, APRIL 3 & 5
Environmental/Pollution Policies

Telephone Roundtable

An informal discussion group for those interested in the economic impact of environmental policies.

APRIL 10-11
Northeast Policy Perspectives
Conference

Philadelphia, PA
An intensive two day seminar on the REMI model and applications, with hands on workshops in a small group setting.

MAY 1-2
Economic Development Analysis for
Counties and Regions

Amherst, MA
An intensive two day seminar on the REMI model and applications, with hands on workshops in a small group setting.

JUNE 5-7
Educational Seminar

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Economic Development Studies Using the REMI Model

Many economic development studies involve the prediction of the effects of a new plant opening in the region. In addition to providing useful information for potential firms that may locate in the local area and in providing an assessment of the implications of those decisions for the economy, REMI models are often used to evaluate projects that require direct or indirect state funding. In assessing such proposals, it is essential to include all parts of the proposal. If funding from the local government is required, then either taxes must be increased or other government spending must be reduced. Because a great deal of discretion is involved in deciding which tax to increase or what government program to cut, the need to balance the budget is not automatically programmed in the model.



Related Articles

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labor pool of surplus labor with the requisite skills and that many of the suppliers were targeted to the automobile industry. To examine relative production costs, they focused on the costs and the components of costs in the supplying industries. They found that Michigan was at a relative disadvantage in this area, with intermediate costs between 2 and 4 percent higher than in the rest of the country. The predicted economic effects from a Mazda automobile assembly plant started with predictions for total effects in the initial construction period in 1985 of 1,250 employees and \$35 million in personal income and increased to 12,201 employees and \$682 million in personal income in 1990 after the construction had been completed, and the plant was in full operation employing 2,500 people.

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Summary:

Kansas City, Missouri's two sports franchises (the Kansas City Royals and the Kansas City Chiefs) make significant contributions to the State of Missouri, Jackson County, and Kansas City, Missouri. The importance of professional sports is measured in terms of economic impact on the State, as well as in terms of its significance as a source of entertainment and quality of life. However, the value of professional sports as a source of entertainment and quality of life is difficult to quantify. In this study, the economic impact of these two franchises is measured only in terms of quantifiable economic activities. Economic impact is defined by the following:

- a. Tax revenue paid to state, county and local governments by the Royals and Chiefs.

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- e. Revenue generated from people outside Missouri (defined as tourist revenue)

The Kansas City Royals and Kansas City Chiefs have a total tax impact on the State of Missouri's economy of \$9.20 million. This includes direct taxes paid by the two organizations to state, county and city governments of \$3.49 million and indirect taxes paid by businesses and workers associated with the Chiefs and Royals of \$5.71 million. The Kansas City Chiefs and Kansas City Royals have an overall impact of \$237.7 million on the metropolitan Kansas City economy. This includes direct spending by the two organizations, indirect spending by businesses supplying goods and services to the Chiefs and Royals, and tourism-related spending. For every dollar's worth of sales directly produced by the Chiefs and Royals, another 1.9 dollars of sales is generated throughout the economy. Every employee of the two organizations generates another 3.0 employees elsewhere in the economy. And for every dollar's worth of income paid in the form of wages and salaries by the Chiefs and Royals, another 1.3 dollars of income is generated for other workers in the economy.

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"Economic Impact of Ball State University on the Muncie Community," by Patrick M. Barkey, January 17, 1997.

Summary:

To say that Ball State University is an important part of the Muncie economy is to state a very obvious fact. What is less obvious to some

is that the economic impact of the University extends far beyond its 4,214 full-time employees, its 18,500 students, and the vendors that supply it with the \$57.4 million worth of goods and services it purchases annually. That is because those whose incomes are directly impacted by the University spend part of those dollars locally, creating income and employment for thousands of people with no direct connection to Ball State. This report presents the results of a study to assess and measure the economic benefits that accrue to all Delaware County residents due to the presence of Ball State University. Our main finding is that these benefits are considerable more than one of every ten jobs, and nearly one of every ten dollars earned in this community owes its existence to Ball State. The spending of the University's employees, students, visitors, plus the budget of the University itself add:

- 7,124 additional jobs, representing \$257 million in annual payroll,

- 26,085 in population, and

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to the Muncie area economy.

Without Ball State, Muncie would be a much different, and much smaller economy, closer in size to Marion or Richmond. The fact that an educational institution with non-profit status could make such a substantial contribution to tax coffers may come as a surprise to some. While the University itself is tax-exempt, its students, employees, and vendors all pay taxes taxes which would never have been collected if the University were located elsewhere. Perhaps the most valuable aspect of the University to the area economy has been its stability. With enrollment constant at about 18,000 students for the past 25 years, the University has been a steady contributor to the economy in years when other sectors, such as retailing or durable manufacturing, have faltered. If the constancy of these contributions have caused any to take the University for granted, consider the findings of this report. Its findings leave little doubt but that Ball State University is the source of many

good things for all residents of
Delaware County.

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Forecasting and Planning with the REMI Regional Economic Modeling System

Economic forecasting is difficult for several reasons. The variables determined outside of the model (i.e., exogenous variables) must be forecast, the dynamic structure of the real economy must be captured in the model, and the effects of processes such as speculative episodes that are not included in the model must be foreseen. In addition to these difficulties, the forecaster must ascertain the current values of the variables in the economic model.

Given the difficulties of economic forecasting, it may be useful to think of a model as an instrument that can correctly capture many of the complex interactions in an economy, but may not include some of the aspects of the economy that might be foreseen by expert observers. In this instance, the model serves as an organizing instrument. It provides a structure within which various experts can bring their knowledge together to generate a coherent and consistent picture of the most likely future of the regional economy, as well as alternative possible futures.



Related Articles

"Forecasting a State's Economy: Maine's Experience," by L. C. Ireland C.S. Colgan, and C. T. Lawton, The Northeast Journal of Business and Economics, Vol. 11, No. 1, 7-19 (Fall/Winter 1984).

Summary:

The Maine State Planning Office carried out a highly cost effective 10 year economic forecasting project. The forecast was built around a purchased model of the State's economy with suitable customizing and the use of informed judgement to "manage" the raw forecasts. Special difficulty was encountered in modeling the labor market, in overcoming data limitations, and, in particular, sectoral submodels. Benefits included a better understanding of the subtle interactions between the labor market and demographic trends, a useful debate over the likelihood of differential growth among subregions of Maine, and several useful policy simulations. Using contract modeling capabilities enabled a cost effective result for a small office which is able to devote staff only part-time to long-term forecasting.

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Energy and Natural Resources: Modeling Their Economic Impact with REMI

Because energy use is pervasive and fuel prices are volatile, fuel costs are an important aspect of the economic vitality of any region. This can be said even though fuel costs represent a small percentage of total production costs for most industries. In addition fuel price changes often depend on the policy changes.

The REMI model has been used to look at the effect of energy price changes that have related to electric rates and to natural gas rates. In most cases, the motivation has been to present evidence for or against the proposed policy on the basis of its implications for the regional economy.

A fuel price increase simulation is accomplished by increasing the appropriate fuel price variable in the model, and by decreasing consumer purchasing power to reflect the extra amount that consumers will have to pay for electricity. To complete any simulation, the effects on the production side must also be considered. Since fuels are often imported, the effect of changing energy strategies may be to substitute local production for imports or to replace local production with an external energy supply. Thus, even when the regional employment effects of fuel price changes are in one direction, the choice of energy source may have direct effects that will change the sign of the predicted employment effects.



Related Articles

"Economic Opportunities Through Energy Efficiency: An Alternative Analysis," by James E. Hickman, January, 1995.

Summary:

A study conducted by the Environmental Improvement and Energy Resources Authority (EIERA, State of Missouri Department of Natural Resources) in December 1993 entitled Economic Opportunities Through Energy Efficiency and the Energy Policy Act of 1992 claims that there are direct economic benefits to Missouri in reducing growth in future electricity and natural gas demand within the state. The argument is that since most of the energy used within the state is produced from fossil fuels that are not extracted in Missouri, that if consumer and business expenditures were diverted from energy to other categories of demand, more money would remain within the state to boost income and employment. EIERA's estimate of just how much of Missouri's energy dollars leave the state first appeared in its 1992 Missouri Statewide Energy Study. That study concluded that in 1990 over \$7 billion of the \$9.7 billion (or 72%) spent on energy in Missouri left the state's economy. The Economic Opportunities Through Energy Efficiency study analyzes

the impact of establishing statewide residential and commercial building codes on income, employment, retail sales and tax revenues in Missouri. However, the study overstates the positive economic impacts of the proposed building code standards, and does not net out any negative impact the standards would have on the state's utility sector. Utilicorp's study, which utilizes a detailed structural model for the state of Missouri, shows that Missouri's utility sector is, in fact, a legitimate and important industry within the state. Thus, any analysis of proposed state energy policies should not overlook, nor trivialize, impacts that energy-efficiency policies would have on the state's utility industry.

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"Forecasting the Effects of Electric Utility Deregulation: A Hypothetical Scenario for New Jersey," by Frederick Treyz and Lisa Petraglia, The Journal of Business Forecasting, 5-7 (Summer 1997).

Summary:

The latest wave of deregulation is transforming the structure of the electricity industry from a patchwork of monopolies to an open system of competitive firms. This change is being led by policy makers who believe that deregulation will result in lower electric rates, and more efficient production and distribution of electric power. The direct changes are tied into broader economic benefits resulting from higher real incomes and increased business competitiveness. In this article, the authors describe how a regional economic forecasting and policy analysis model is used to quantify the effects of electric utility deregulation on a regional economy.

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"Economic Impact and

Benefit/Cost of High Speed Rail for California," by Economic Research Associates, submitted to California Intercity High Speed Rail Commission, September, 1996.

Summary:

This study compared the overall and component economic impacts of two high-speed rail alternatives, the very high-speed steel wheel alternative and the maglev alternative, on the California economy. In addition, the study examined the benefit versus cost relationship of the two HSR alternatives and evaluated station area development, land value impacts and social equity issues.

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Modeling and Forecasting Transportation Infrastructure Investments with REMI



Related Articles

The direct effects of transportation infrastructure investments fall into various categories. The key categories are as follows:

1. **construction and construction financing effects;**
2. **operating effects;**
3. **environmental effects;**
4. **tourism effects;**
5. **cost savings for businesses; and**
6. **cost savings (including safety improvements) for consumers and commuters.**

The construction effects are handled in a straightforward manner by inputting the specific spending for the types of construction involved. The construction financing effects are addressed by changing appropriate tax rates or reducing alternative government expenditures by the appropriate amounts.

The operating effects are of significance for public transportation facilities. These are input into the model by increasing employment in the appropriate sector, reducing consumer expenditures on other types of transportation, and increasing taxes to pay subsidies.

The environmental effects apply mainly to substituting public transportation for private automobile transportation and are considered in the environmental section below.

Tourism effects are discussed in the economic development section above.

The effect of the improved roads is to reduce trucking costs. This reduction is accomplished by increasing productivity in the trucking industry in the model. In addition, productivity gains should also be introduced for industries that supply their own trucking. Transportation improvements that lead to reduced costs will reduce sales prices for regional industries. These

"Measuring Economic Development Benefits for Highway Decision-making: The Wisconsin Case," by Glen E. Weisbrod and James Beckwith, Transportation Quarterly, Vol. 46, No. 1, 57-79 (January 1992).

Summary:

This article examines issues involved in measuring and evaluating economic development impacts of major highway investment, and application of those findings for investment decision-making. It focuses on a proposed highway construction project to create a 200 mile four-lane highway across North-Central Wisconsin. This corridor would provide a major east-west link from Green Bay and Appleton on the east to Eau Claire and Chippewa Falls to the west where the route intersects with I-94 and continues on to Minnesota. The study evaluated five alternative levels of improvement for the Highway 29/45/10 Corridor, ranging from a two-lane arterial to a full freeway. A major motivation for considering the highway improvement was the belief, promoted by community and business leaders, that a high-quality four-lane highway connecting cities across the corridor could significantly enhance economic growth in the region. It was generally felt that unless highway improvements to the

reductions will be appropriately transmitted through the model. However, transportation cost reductions that directly reduce sales prices are different than other price reductions. They apply equally to competing imports to the extent that they reduce costs for imports. Therefore, the competitive response in the model for regional industries that increases local market shares when there are reductions in sales prices must be offset by appropriate reductions in the market share when these decreases stem directly from reduced transportation costs.

The savings to automobile users is a reduction in cost (less commuting time) or increase in benefits (safer travel) that will not be reflected by price indexes. Therefore, it should be treated as an amenity gain, and the amenity term in the migration equation should be adjusted by an amount that reflects the dollar value of non-pecuniary gains. This will increase the net number of migrants into the area, and have ramifications in the labor market and the rest of the model.

If a primary goal is to use transportation infrastructure improvements to foster economic development, then the increase in the variable of interest (e.g., employment, real disposable income, or real per capita income for current residents) per dollar of cost would be the appropriate measure for evaluating competing projects.

corridor were evaluated in terms of long-range economic development potential, the benefits of the corridor improvement would be underestimated. At the state level, there was also interest in using transportation investments to promote economic development objectives. The Wisconsin Department of Transportation was very interested in expanding its cost-benefit analysis to include not only benefits to the user, but also benefits to the economy. Accordingly, the department commissioned a study to assess potential long-term economic development benefits of building a new major four-lane facility across the state. The most notable aspect of this study is its breadth. The analysis process included an integrated set of simulation and forecasting models of the economy and the transportation network to evaluate potential impacts of this major highway investment. In addition to projecting benefits to auto travelers, the study focused on estimating impacts on expansion of existing business, attraction of new business, and tourism growth. Specific attention focused on providing a rigorous framework for benefit assessment that avoids double counting, a typical problem of economic impact assessment. In addition, attention was given to providing a methodology for estimating transportation and economic impacts that adequately recognizes implications of business efficiency benefits, a shortcoming of some prior economic assessment studies. This article provides an overview of how economic impacts were measured, describes the analysis modeling techniques used and shows how benefit-cost analysis was applied for highway investment decision-making.

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"Estimating the Economic Impacts of a Hub Airline Serving a Tourist Destination: The Case of America West Airlines and Las Vegas, Nevada," by John H. Brown, Thomas M. Carroll, Dan S. Rickman, and R. Keith

Schwer, International Journal of Public Administration, 18(1), 167-182 (1995).

Summary:

Airlines are an important component of regional economies. The economic impact of an airline goes beyond the usual impacts of their payroll and expenditures. Airlines also may affect business productivity and the critical economic base of a regional economy. This article estimates the economic impact of America West Airlines on Las Vegas, Nevada. Key aspects of the study were measurement of the direct impacts, estimation of the associated impact on tourism allowing for the possibility of competing travel alternatives, and the use of a regional economic impact model to derive the total economic impact.

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"Economic Impact and Benefit/Cost of High Speed Rail for California," by Economic Research Associates, submitted to California Intercity High Speed Rail Commission, September, 1996.

Summary:

This study compared the overall and component economic impacts of two high-speed rail alternatives, the very high-speed steel wheel alternative and the maglev alternative, on the California economy. In addition, the study examined the benefit versus cost relationship of the two HSR alternatives and evaluated station area development, land value impacts and social equity issues.

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Impact Analysis of Environmental Policies

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A growing concern about the environment has led to national and local legislation that is directed toward the reduction of all types of pollution. New rules, regulations, and marketable permit plans designed to improve the environment have important regional socio-economic effects. REMI models are used extensively to predict these effects.



Related Articles

"Estimating the Economic and Demographic Effects of an Air Quality Management Plan: the Case of Southern California," by S. Lieu and G.I. Treyz, Environment and Planning A, Vol. 24, 1799-1811 (1992).

Summary:

The 1991 Air Quality Management Plan (AQMP) for the south coast air basin in California is designed to meet federal and state air quality standards. The direct effects of implementing the plan fall into the following categories: changes in business costs, shifts in the composition and amount of spending, and increases in quality-of-life amenities. Inputting these effects into an economic and demographic forecasting and simulation model of the basin's economy, that includes business and human migration responses, we predict that up to the year 2000 employment will be increased by the AQMP, whereas real per capita disposable income (as it is traditionally measured) will decrease. Net increases in employment result because decreases arising from increased costs are offset by net increases from spending changes and the effects of migration arising from amenity benefits derived from improved air quality.

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"Regional Impacts of Air Quality Regulation: Applying an Economic Model," by Sue Lieu, Contemporary Policy Issues, Vol. IX, 24-34 (July 1991).

Summary:

The South Coast Air Quality Management District promulgated an Air Quality Management Plan (AQMP) in 1989 to attain federal air quality standards for the South Coast Air Basin by the year 2007. Because the AQMP affects all walks of life, its economic impact has become the focal point of debates. This paper examines not only the traditional approach to evaluating the direct cost of a public policy change on the regulated community, but also a systematic approach to assessing direct and indirect impacts of such a policy change. This latter approach will enhance the decision-making process by allowing one to compare the impacts of various projects in the same context.

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"Predicting the Local Economic Effects of Proposed Trip-Reduction Rules: the Case of San Diego," by G.I. Treyz, R. Bradley, L. Petraglia, and A.M. Rose, Environment and Planning A, Vol. 28, 1315-1327 (1996).

Summary:

The United States 1990 Clean Air Act Amendments set aggressive goals for state-level compliance and mandates for the use of employer trip-reduction (ETR) programs for certain regions. San Diego County, California, has responded to this mandate with its own trip-reduction regulations. The direct effects of the trip-reduction regulations fall into three categories, as follows: changes in spending, changes in costs, and changes in consumer amenities. The total effects on the local economy due to each of these

categories are estimated using a Regional Economic Models, Inc. (REMI) forecasting and simulation model for San Diego County. This study is the first to use such a comprehensive methodology for an analysis of an ETR program. The study results show that spending effects on employment were positive, as local transit use replaced automotive-related expenditures and employees received cash incentive payments. The net increase in costs on businesses were modest with respect to the overall size of San Diego's economy. Consequently, the negative effects on business location due to these direct effects were also modest. There were significant effects from the program due to consumer utility reductions because subsidies and charges distorted consumer choices.

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"The Regional Economic Impacts of Voluntary Pollution Prevention in New Jersey," by Kelly Robinson, Business Strategy

Summary:

Recent experience with voluntary pollution prevention (P2) for five industries in the state of New Jersey is examined. Using a regional econometric model, it is estimated that P2 will increase regional value added between \$3 million and \$5 million per year between 1994 and 2005 (1994 US dollars). Most of this gain is in the chemical sector. While small, given the size of the industries studied, the level of P2 in these industries is also small. Furthermore, these estimates exclude environmental benefits and returns from recycling. One significant contribution of the research is to examine the economic impact on the chemical industry of P2-related reductions in sales. Surprisingly, it is found that P2 may well increase the demand for chemicals locally, because increased efficiency will allow local firms to expand exports.



Taxation, Budget, and Welfare Decisions Using Economic Models



Related Articles

"How Could Tax Reform Impact Economic Growth in Indiana?," by Cecil E. Bohanon and James E. McClure, prepared for The Indiana Association of Realtors, February 24, 1997.

Summary:

Tax reform is currently the "talk of the town" in Indianapolis. This report explores the connection between taxes, and more specifically tax structure, and the growth of Indiana's economy. Some of the primary non-tax determinants of economic growth are: 1) economic convergence; 2) market size; 3) economic shocks; 4) living amenities; and 5) public sector spending. Thirty years ago, factors such as these were presumed to so dwarf state tax policies as to make tax policy trivial in its impact on economic growth. Today, because of better specified models, improved data, and higher levels of state taxation, the consensus view of economists now conforms with common sense all else remaining the same, tax increases stunt economic growth and tax reductions stimulate economic growth. From the projections made in this study, the authors conclude that state tax changes that shift tax burden from businesses to individuals are likely to stimulate growth. In particular for every million dollars in tax burden shifted, we estimate \$1.5

State governments face many fiscal decisions that have consequences for their state's economy. These decisions involve changes in tax rates, budgetary spending, and transfer payments.

There are three major categories of state taxes: business, sales, and income taxes. Business taxes influence the implicit rental cost of capital. However, the relationship between the changes in the cost of capital and the change in the size and timing of business tax receipts may be unique to that particular tax provision. For example, a change in the corporate tax rate that increases the cost of capital by one percent next year may yield revenue to change the investment tax credit by enough to cut the cost of capital by two percent. Thus, a tax change that is revenue neutral might reduce the cost of capital in the short term and stimulate investment in the state. To carry out tax simulations, the revenue consequences must also be estimated.

Sales taxes enter the model as an increase in consumer prices. Of course, the decreased purchasing power caused by increased sales taxes reduces local purchases and, thus, local employment. Sales tax increases also deter inward migration by driving a bigger wedge between nominal personal and real disposable income.

Changes in income taxes reduce purchasing power by directly reducing disposable income and, therefore, have many of the same impacts in an economy as a sales tax change.

Local governments may change property taxes. These changes effect the cost of capital and directly reduce consumer purchasing power. Of course, these tax changes will be combined with changes in local government spending.

Shifts in the state budget spending priorities, in addition to those directly aimed at economic development, can

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have important economic consequences. In each case, any secondary effects not captured directly in the model should be entered as additional policy variables. For example, a shift from state and local spending on safety to education may have consequences for labor productivity as well as for the amenity attractiveness of a local area relative to other areas. While amenity changes are hard to measure, studies are available that have examined the relationship of public spending per pupil to student performances and to the amenity attractiveness of reducing student-teacher ratios.

million in increased state GDP in the long-run. The work in this report, taken as a whole, leads the authors to conclude that a simultaneous reduction in business taxes (such as the corporate income and property tax) and into personal taxes (such as the sales tax) would provide a mild boost to the economic growth rate in Indiana.

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"Analysis of the Economic Impact of Proposed Medicaid Budget Cuts in New York State," by Allen Dobson, Robert Mechanic, Walter Bottiny, and Brian Choi, prepared for Greater New York Hospital Association Healthcare Association of New York State, March 6, 1995.

Summary:

On February 1, 1995, Governor George E. Pataki presented his Executive Budget to the New York State Legislature, which contained \$1.2 billion in proposed state funding reductions in the Medicaid program, including cuts to hospitals, nursing homes, home and personal care providers, and other providers, as well as cuts in recipient benefits. The proposed reductions represent 19 percent of the projected state spending of \$6.4 billion in the Medicaid budget for fiscal year (FY) 1995-96, which begins on April 1, 1995. By FY 1996-97, when the proposed cuts are fully phased in, state savings are estimated to grow to \$1.6 billion. When local and federal Medicaid matching funds are also taken into account, the overall reduction in Medicaid spending would be \$3.6 billion in FY 1995-96 and \$5.1 billion in FY 1996-97. This study was commissioned to assess the net economic impact of the proposed Medicaid cuts.

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Predicting Regional Economic Impact of Changes in National Policy

Changes in economic policy at the national level can influence a sub-national area through their effect on the national economy as a whole or through their relative and direct effects on the region or regions being analyzed. In the first case, it is always necessary to perform a national simulation as part of carrying out regional analyses. In the second case, it is only necessary to carry out the national simulation if the reverberation of the policy on the nation as a whole creates significant feedbacks for the sub-national area in question.

With major shifts in policy high on the national agenda, interest in looking at the effects of these policies on local economies is likely to continue to grow. The fact that some of the proposed policy changes would lead to a devolution of federal responsibilities to the states means that considerations, such as interstate competitive effects, will now become part of the policy analysis process. REMI models are available at the regional, national, as well as multi-regional U.S. levels in order to be able to answer any type of policy question. Use of the regional model alone is sufficient when comparing regional options, looking at state and local initiatives, or for exogenous events that affect a region only and that is small relative to the U.S. A national model plus a regional model, or a multi-regional U.S. model is necessary if you want to know the net effect of the policy on the region, the effect on the U.S. and/or regions of the U.S., or if you want to look at the regional effects of alternative U.S. forecasts.

Since local economies in an open system where money flows freely from one area to another generally share a common interest rate, the REMI regional models have a local cost of capital but do not include an endogenous interest rate. However, at the national level the monetary system must become endogenous. Specifically, the reactions of the Federal Reserve system to changes in the unemployment rate (and its consequences for inflation) must also be endogenous. An interest-rate response has been incorporated into the REMI national models that brings the economy close to its control path



Related Articles

"Employment Implications of Declining Tobacco Product Sales for the Regional Economies of the United States," by Kenneth E. Warner, George A. Fulton, Peter Nicolas, and Donald R. Grimes, The Journal of the American Medical Association, Vol. 275, 1241-1246 (April 24, 1996).

Summary:

The objective of this study is to determine whether declines in tobacco product sales significantly reduce employment in the United States, as the tobacco industry claims. Computer simulation of the economies of the Southeast Tobacco region and 8 non-tobacco regions of the United States, with domestic tobacco expenditures eliminated or reduced and the equivalent spending redistributed, according to consumers' normal spending patterns. We compared these results with baseline forecasts of the regional economies that include normal tobacco expenditures. Had there been no spending on tobacco products in the United States in 1993, the Southeast Tobacco region would have had 303,000 fewer jobs. Collectively, however, the 8 non-tobacco regions would have gained enough employment to completely offset losses in the Southeast Tobacco region, with every non-tobacco region gaining jobs. By the

by the fourth year after a policy stimulus. In addition to this default response, which reflects the historically observed U.S. unemployment response, two other options are provided to the user. The first assumes that the Federal Reserve cooperates fully and takes anticipatory action to completely offset the unemployment effects of any policy change, even in the first year. Under the second option, the typical Keynesian assumptions are made. There is no interest rate response and thus a policy may have a long-run effect on the unemployment rate.

year 2000, the absence of tobacco spending would mean a loss of 222,000 jobs in the Southeast Tobacco region, but a gain of 355,000 throughout the rest of the country. In the more realistic scenario of doubling the downward trend in tobacco consumption, the Southeast Tobacco region would lose 6300 jobs in 1993 (0.03% of regional employment) and 36,600 jobs by 2000 (0.2%). The 8 non-tobacco regions would gain 6400 jobs in 1993 and 56,300 jobs in 2000, with each of the non-tobacco regions gaining employment in every year. Contrary to the tobacco industry's claims, reductions in spending on tobacco products will boost employment in every one of the 8 non-tobacco regions and will not diminish employment in the Southeast Tobacco region by as much as the industry estimates. The primary concern about tobacco should be the enormity of its toll on health and not its impact on employment.

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"The Economic Impact of the Domestic Automotive Industry on the United States and Its Major Regions," by George A. Fulton and Donald R. Grimes, prepared for the U.S. Department of Commerce, Economic Development Administration, Technical Assistance and Research Division, September 1993.

Summary:

In this study, the economic impact of domestic automotive activity is assessed, both for the United States in total and by major economic region. The study provides quantitative estimates of the effect on the regional economies of an increase in the share of motor vehicle sales accounted for by domestic producers. The estimates include not only direct effects within the industry itself, but also spin-off effects across other industries from increased purchases by domestic suppliers and additional purchasing activities of consumers and

business. Also presented are historical statistics on the structure of the regional economies, and changes in this structure since the late 1970s. Two sets of experiments are carried out in the study, using two different theoretical models. The first is a short-run disequilibrium model, which assumes that there is enough unemployed labor in the United States to absorb the increase in auto activity without a reduction in employment in other sectors of the economy. An increase in production of 500,000 vehicles per year generates 119,094 private sector jobs in the U.S. economy, including 15,336 direct auto jobs and 103,758 spin-off jobs. The benefits of the impact are realized across many industry divisions, including non-manufacturing; all regions benefit to some extent. The second set of experiments is based on a long-run general equilibrium model, where any increase in employment caused by an increase in domestic motor vehicle production is assumed to be offset by a decrease in employment in other sectors. In the experiments chosen for the study, the structural change in the U.S. economy increases national income. The job and income effects vary greatly by region, with some regions gaining and others losing. The study is intended to improve our understanding of the auto industry's role in the regional economies, and of the potential effect of policy that alters that role.

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Economic Development Studies Using the REMI Model

Many economic development studies involve the prediction of the effects of a new plant opening in the region. In addition to providing useful information for potential firms that may locate in the local area and in providing an assessment of the implications of those decisions for the economy, REMI models are often used to evaluate projects that require direct or indirect state funding. In assessing such proposals, it is essential to include all parts of the proposal. If funding from the local government is required, then either taxes must be increased or other government spending must be reduced. Because a great deal of discretion is involved in deciding which tax to increase or what government program to cut, the need to balance the budget is not automatically programmed in the model.



Related Articles

"Industrial Location Decisions and Their Impact on the Michigan Economy: The Mazda Automobile Assembly Case," by George A. Fulton, Donald R. Grimes, and Alan L. Baum, paper presented to the Economic and Social Outlook Conference at the University of Michigan at Ann Arbor, November 15 and 16, 1984.

Summary:

An extremely detailed analysis was undertaken to answer two questions: 1.) What are the state's relative locational advantages and disadvantages for the potential industry?; and 2.) Given a decision to locate in Michigan, what is the impact on the state economy of the new activities generated? To answer the first question, they examined the historical series generated by the REMI model for each state. They concentrated on constructing two measures, the local availability of inputs and relative production costs. They found that the percentage of required inputs for Motor Vehicle Assembly supplied locally were 43.3 percent in Michigan, but were only 19.0, 13.8, and 23.1 percent for their three competitor states, which were South Carolina, Nebraska, and Indiana respectively. They also noted that Michigan has a large under-utilized

labor pool of surplus labor with the requisite skills and that many of the suppliers were targeted to the automobile industry. To examine relative production costs, they focused on the costs and the components of costs in the supplying industries. They found that Michigan was at a relative disadvantage in this area, with intermediate costs between 2 and 4 percent higher than in the rest of the country. The predicted economic effects from a Mazda automobile assembly plant started with predictions for total effects in the initial construction period in 1985 of 1,250 employees and \$35 million in personal income and increased to 12,201 employees and \$682 million in personal income in 1990 after the construction had been completed, and the plant was in full operation employing 2,500 people.

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"The Economic Impact of the Kansas City Chiefs and Kansas City Royals on the State of Missouri," by Mid-America Regional Council and Mayer Hoffman McCann, February 1989.

Summary:

Kansas City, Missouri's two sports franchises (the Kansas City Royals and the Kansas City Chiefs) make significant contributions to the State of Missouri, Jackson County, and Kansas City, Missouri. The importance of professional sports is measured in terms of economic impact on the State, as well as in terms of its significance as a source of entertainment and quality of life. However, the value of professional sports as a source of entertainment and quality of life is difficult to quantify. In this study, the economic impact of these two franchises is measured only in terms of quantifiable economic activities. Economic impact is defined by the following:

- a. Tax revenue paid to state, county and local governments by the Royals and Chiefs.

- b. Indirect tax revenue generated by businesses and workers associated with the Royals and Chiefs.
- c. The direct spending, employment and income generated by the two franchises.
- d. The indirect spending by the Chiefs and the Royals.
- e. Revenue generated from people outside Missouri (defined as tourist revenue)

The Kansas City Royals and Kansas City Chiefs have a total tax impact on the State of Missouri's economy of \$9.20 million. This includes direct taxes paid by the two organizations to state, county and city governments of \$3.49 million and indirect taxes paid by businesses and workers associated with the Chiefs and Royals of \$5.71 million. The Kansas City Chiefs and Kansas City Royals have an overall impact of \$237.7 million on the metropolitan Kansas City economy. This includes direct spending by the two organizations, indirect spending by businesses supplying goods and services to the Chiefs and Royals, and tourism-related spending. For every dollar's worth of sales directly produced by the Chiefs and Royals, another 1.9 dollars of sales is generated throughout the economy. Every employee of the two organizations generates another 3.0 employees elsewhere in the economy. And for every dollar's worth of income paid in the form of wages and salaries by the Chiefs and Royals, another 1.3 dollars of income is generated for other workers in the economy.

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"The Economic Implications of Tobacco Product Sales in a Non-tobacco State," by Kenneth E. Warner and George A. Fulton, The Journal of the American Medical Association, Vol. 271, N . 10, 771-776 (March 9, 1994).

Summary:

"The tobacco industry claims that

tobacco makes a significant economic contribution to each of the states in the United States. We sought to determine whether Michigan, a non-tobacco state, would reap more economic benefits from the presence or absence of tobacco product sales. We simulated Michigan's economy with tobacco expenditures eliminated or reduced and the equivalent spending redistributed to other goods and services, according to consumer's normal spending patterns. We compare these results with baseline forecasts of the economy. Michigan would have had 5600 more jobs in 1992 had there been no expenditure on tobacco products, with equivalent spending redistributed to other goods and services (and to other taxes, to replace half of lost cigarette excise tax revenues). By the year 2005, a tobacco-free Michigan would still have almost 1500 more jobs than it will have if sales trends for tobacco products continue (i.e., gradually declining over time). If, instead of tobacco expenditures ceasing, the contemporary rate of decline in tobacco consumption had doubled, the state would have had over 300 more jobs in 1992 and would have nearly 800 more in 2005. With cigarette excise tax revenues not replaced, the elimination of spending on tobacco products would have decreased Michigan's tax revenues by \$254 million in 1992. The more realistic doubling of the expected decline in smoking would have decreased revenues by \$14 million that year. Reducing or eliminating tobacco product spending in Michigan will increase employment in the state, as well as health."

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"Economic Impact of Ball State University on the Muncie Community," by Patrick M. Bark y, January 17, 1997.

Summary:

To say that Ball State University is an important part of the Muncie economy is to state a very obvious fact. What is less obvious to some

is that the economic impact of the University extends far beyond its 4,214 full-time employees, its 18,500 students, and the vendors that supply it with the \$57.4 million worth of goods and services it purchases annually. That is because those whose incomes are directly impacted by the University spend part of those dollars locally, creating income and employment for thousands of people with no direct connection to Ball State. This report presents the results of a study to assess and measure the economic benefits that accrue to all Delaware County residents due to the presence of Ball State University. Our main finding is that these benefits are considerable more than one of every ten jobs, and nearly one of every ten dollars earned in this community owes its existence to Ball State. The spending of the University's employees, students, visitors, plus the budget of the University itself add:

- 7,124 additional jobs, representing \$257 million in annual payroll,
- 26,085 in population, and
- \$21.9 million in annual state and local tax revenue

to the Muncie area economy. Without Ball State, Muncie would be a much different, and much smaller economy, closer in size to Marion or Richmond. The fact that an educational institution with non-profit status could make such a substantial contribution to tax coffers may come as a surprise to some. While the University itself is tax-exempt, its students, employees, and vendors all pay taxes taxes which would never have been collected if the University were located elsewhere. Perhaps the most valuable aspect of the University to the area economy has been its stability. With enrollment constant at about 18,000 students for the past 25 years, the University has been a steady contributor to the economy in years when other sectors, such as retailing or durable manufacturing, have faltered. If the constancy of these contributions have caused any to take the University for granted, consider the findings of this report. Its findings leave little doubt but that Ball State University is the source of many

good things for all residents of
Delaware County.

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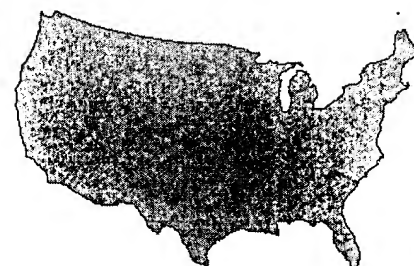
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Forecasting and Planning with the REMI Regional Economic Modeling System

Economic forecasting is difficult for several reasons. The variables determined outside of the model (i.e., exogenous variables) must be forecast, the dynamic structure of the real economy must be captured in the model, and the effects of processes such as speculative episodes that are not included in the model must be foreseen. In addition to these difficulties, the forecaster must ascertain the current values of the variables in the economic model.

Given the difficulties of economic forecasting, it may be useful to think of a model as an instrument that can correctly capture many of the complex interactions in an economy, but may not include some of the aspects of the economy that might be foreseen by expert observers. In this instance, the model serves as an organizing instrument. It provides a structure within which various experts can bring their knowledge together to generate a coherent and consistent picture of the most likely future of the regional economy, as well as alternative possible futures.



Related Articles

"Forecasting a State's Economy: Maine's Experience," by L. C. Ireland C.S. Colgan, and C. T. Lawton, The Northeast Journal of Business and Economics, Vol. 11, No. 1, 7-19 (Fall/Winter 1984).

Summary:

The Maine State Planning Office carried out a highly cost effective 10 year economic forecasting project. The forecast was built around a purchased model of the State's economy with suitable customizing and the use of informed judgement to "manage" the raw forecasts. Special difficulty was encountered in modeling the labor market, in overcoming data limitations, and, in particular, sectoral submodels. Benefits included a better understanding of the subtle interactions between the labor market and demographic trends, a useful debate over the likelihood of differential growth among subregions of Maine, and several useful policy simulations. Using contract modeling capabilities enabled a cost effective result for a small office which is able to devote staff only part-time to long-term forecasting.

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Energy and Natural Resources: Modeling Their Economic Impact with REMI

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Because energy use is pervasive and fuel prices are volatile, fuel costs are an important aspect of the economic vitality of any region. This can be said even though fuel costs represent a small percentage of total production costs for most industries. In addition fuel price changes often depend on the policy changes.

The REMI model has been used to look at the effect of energy price changes that have related to electric rates and to natural gas rates. In most cases, the motivation has been to present evidence for or against the proposed policy on the basis of its implications for the regional economy.

A fuel price increase simulation is accomplished by increasing the appropriate fuel price variable in the model, and by decreasing consumer purchasing power to reflect the extra amount that consumers will have to pay for electricity. To complete any simulation, the effects on the production side must also be considered. Since fuels are often imported, the effect of changing energy strategies may be to substitute local production for imports or to replace local production with an external energy supply. Thus, even when the regional employment effects of fuel price changes are in one direction, the choice of energy source may have direct effects that will change the sign of the predicted employment effects.



Related Articles

"Economic Opportunities Through Energy Efficiency: An Alternative Analysis," by James E. Hickman, January, 1995.

Summary:

A study conducted by the Environmental Improvement and Energy Resources Authority (EI ERA, State of Missouri Department of Natural Resources) in December 1993 entitled Economic Opportunities Through Energy Efficiency and the Energy Policy Act of 1992 claims that there are direct economic benefits to Missouri in reducing growth in future electricity and natural gas demand within the state. The argument is that since most of the energy used within the state is produced from fossil fuels that are not extracted in Missouri, that if consumer and business expenditures were diverted from energy to other categories of demand, more money would remain within the state to boost income and employment. EI ERA's estimate of just how much of Missouri's energy dollars leave the state first appeared in its 1992 Missouri Statewide Energy Study. That study concluded that in 1990 over \$7 billion of the \$9.7 billion (or 72%) spent on energy in Missouri left the state's economy. The Economic Opportunities Through Energy Efficiency study analyzes

the impact of establishing statewide residential and commercial building codes on income, employment, retail sales and tax revenues in Missouri. However, the study overstates the positive economic impacts of the proposed building code standards, and does not net out any negative impact the standards would have on the state's utility sector. Utilicorp's study, which utilizes a detailed structural model for the state of Missouri, shows that Missouri's utility sector is, in fact, a legitimate and important industry within the state. Thus, any analysis of proposed state energy policies should not overlook, nor trivialize, impacts that energy-efficiency policies would have on the state's utility industry.

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"Forecasting the Effects of Electric Utility Deregulation: A Hypothetical Scenario for New Jersey," by Frederick Treyz and Lisa Petraglia, The Journal of Business Forecasting, 5-7 (Summer 1997).

Summary:

The latest wave of deregulation is transforming the structure of the electricity industry from a patchwork of monopolies to an open system of competitive firms. This change is being led by policy makers who believe that deregulation will result in lower electric rates, and more efficient production and distribution of electric power. The direct changes are tied into broader economic benefits resulting from higher real incomes and increased business competitiveness. In this article, the authors describe how a regional economic forecasting and policy analysis model is used to quantify the effects of electric utility deregulation on a regional economy.

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"Economic Opportunities Through Energy Efficiency: An Alternative Analysis," by James E. Hickman, January, 1995.

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"Economic Impact and

Benefit/Cost of High Speed Rail for California," by Economic Research Associates, submitted to California Intercity High Speed Rail Commission, September, 1996.

Summary:

This study compared the overall and component economic impacts of two high-speed rail alternatives, the very high-speed steel wheel alternative and the maglev alternative, on the California economy. In addition, the study examined the benefit versus cost relationship of the two HSR alternatives and evaluated station area development, land value impacts and social equity issues.

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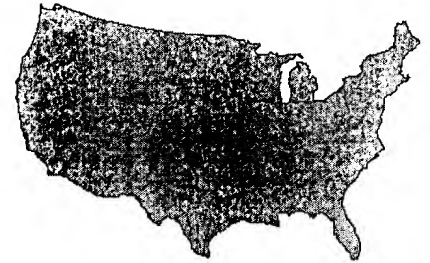
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A growing concern about the environment has led to national and local legislation that is directed toward the reduction of all types of pollution. New rules, regulations, and marketable permit plans designed to improve the environment have important regional socio-economic effects. REMI models are used extensively to predict these effects.



Related Articles

"Estimating the Economic and Demographic Effects of an Air Quality Management Plan: the Case of Southern California," by S. Lieu and G.I. Treyz, *Environment and Planning A*, Vol. 24, 1799-1811 (1992).

Summary:

The 1991 Air Quality Management Plan (AQMP) for the south coast air basin in California is designed to meet federal and state air quality standards. The direct effects of implementing the plan fall into the following categories: changes in business costs, shifts in the composition and amount of spending, and increases in quality-of-life amenities. Inputting these effects into an economic and demographic forecasting and simulation model of the basin's economy, that includes business and human migration responses, we predict that up to the year 2000 employment will be increased by the AQMP, whereas real per capita disposable income (as it is traditionally measured) will decrease. Net increases in employment result because decreases arising from increased costs are offset by net increases from spending changes and the effects of migration arising from amenity benefits derived from improved air quality.

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"Regional Impacts of Air Quality Regulation: Applying an Economic Model," by Sue Lieu, Contemporary Policy Issues, Vol. IX, 24-34 (July 1991).

Summary:

The South Coast Air Quality Management District promulgated an Air Quality Management Plan (AQMP) in 1989 to attain federal air quality standards for the South Coast Air Basin by the year 2007. Because the AQMP affects all walks of life, its economic impact has become the focal point of debates. This paper examines not only the traditional approach to evaluating the direct cost of a public policy change on the regulated community, but also a systematic approach to assessing direct and indirect impacts of such a policy change. This latter approach will enhance the decision-making process by allowing one to compare the impacts of various projects in the same context.

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"Predicting the Local Economic Effects of Proposed Trip-Reduction Rules: the Case of San Diego," by G.I. Treyz, R. Bradley, L. Petraglia, and A.M. Rose, Environment and Planning A, Vol. 28, 1315-1327 (1996).

Summary:

The United States 1990 Clean Air Act Amendments set aggressive goals for state-level compliance and mandates for the use of employer trip-reduction (ETR) programs for certain regions. San Diego County, California, has responded to this mandate with its own trip-reduction regulations. The direct effects of the trip-reduction regulations fall into three categories, as follows: changes in spending, changes in costs, and changes in consumer amenities. The total effects on the local economy due to each of these

categories are estimated using a Regional Economic Models, Inc. (REMI) forecasting and simulation model for San Diego County. This study is the first to use such a comprehensive methodology for an analysis of an ETR program. The study results show that spending effects on employment were positive, as local transit use replaced automotive-related expenditures and employees received cash incentive payments. The net increase in costs on businesses were modest with respect to the overall size of San Diego's economy. Consequently, the negative effects on business location due to these direct effects were also modest. There were significant effects from the program due to consumer utility reductions because subsidies and charges distorted consumer choices.

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"The Regional Economic Impacts of Voluntary Pollution Prevention in New Jersey," by Kelly Robinson, Business Strategy

Summary:

Recent experience with voluntary pollution prevention (P2) for five industries in the state of New Jersey is examined. Using a regional econometric model, it is estimated that P2 will increase regional value added between \$3 million and \$5 million per year between 1994 and 2005 (1994 US dollars). Most of this gain is in the chemical sector. While small, given the size of the industries studied, the level of P2 in these industries is also small. Furthermore, these estimates exclude environmental benefits and returns from recycling. One significant contribution of the research is to examine the economic impact on the chemical industry of P2-related reductions in sales. Surprisingly, it is found that P2 may well increase the demand for chemicals locally, because increased efficiency will allow local firms to expand exports.



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Taxation, Budget, and Welfare Decisions Using Economic Models



Related Articles

"How Could Tax Reform Impact Economic Growth in Indiana?,"
by Cecil E. Bohanon and James
E. McClure, prepared for The
Indiana Association of Realtors,
February 24, 1997.

Summary:

Tax reform is currently the "talk of the town" in Indianapolis. This report explores the connection between taxes, and more specifically tax structure, and the growth of Indiana's economy. Some of the primary non-tax determinants of economic growth are: 1) economic convergence; 2) market size; 3) economic shocks; 4) living amenities; and 5) public sector spending. Thirty years ago, factors such as these were presumed to so dwarf state tax policies as to make tax policy trivial in its impact on economic growth. Today, because of better specified models, improved data, and higher levels of state taxation, the consensus view of economists now conforms with common sense all else remaining the same, tax increases stunt economic growth and tax reductions stimulate economic growth. From the projections made in this study, the authors conclude that state tax changes that shift tax burden from businesses to individuals are likely to stimulate growth. In particular for every million dollars in tax burden shifted, we estimate \$1.5

State governments face many fiscal decisions that have consequences for their state's economy. These decisions involve changes in tax rates, budgetary spending, and transfer payments.

There are three major categories of state taxes: business, sales, and income taxes. Business taxes influence the implicit rental cost of capital. However, the relationship between the changes in the cost of capital and the change in the size and timing of business tax receipts may be unique to that particular tax provision. For example, a change in the corporate tax rate that increases the cost of capital by one percent next year may yield revenue to change the investment tax credit by enough to cut the cost of capital by two percent. Thus, a tax change that is revenue neutral might reduce the cost of capital in the short term and stimulate investment in the state. To carry out tax simulations, the revenue consequences must also be estimated.

Sales taxes enter the model as an increase in consumer prices. Of course, the decreased purchasing power caused by increased sales taxes reduces local purchases and, thus, local employment. Sales tax increases also deter inward migration by driving a bigger wedge between nominal personal and real disposable income.

Changes in income taxes reduce purchasing power by directly reducing disposable income and, therefore, have many of the same impacts in an economy as a sales tax change.

Local governments may change property taxes. These changes affect the cost of capital and directly reduce consumer purchasing power. Of course, these tax changes will be combined with changes in local government spending.

Shifts in the state budget spending priorities, in addition to those directly aimed at economic development, can

have important economic consequences. In each case, any secondary effects not captured directly in the model should be entered as additional policy variables. For example, a shift from state and local spending on safety to education may have consequences for labor productivity as well as for the amenity attractiveness of a local area relative to other areas. While amenity changes are hard to measure, studies are available that have examined the relationship of public spending per pupil to student performances and to the amenity attractiveness of reducing student-teacher ratios.

million in increased state GDP in the long-run. The work in this report, taken as a whole, leads the authors to conclude that a simultaneous reduction in business taxes (such as the corporate income and property tax) and into personal taxes (such as the sales tax) would provide a mild boost to the economic growth rate in Indiana.

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"Analysis of the Economic Impact of Proposed Medicaid Budget Cuts in New York State,"
by Allen Dobson, Robert Mechanic, Walter Bottiny, and Brian Choi, prepared for Greater New York Hospital Association Healthcare Association of New York State, March 6, 1995.

Summary:

On February 1, 1995, Governor George E. Pataki presented his Executive Budget to the New York State Legislature, which contained \$1.2 billion in proposed state funding reductions in the Medicaid program, including cuts to hospitals, nursing homes, home and personal care providers, and other providers, as well as cuts in recipient benefits. The proposed reductions represent 19 percent of the projected state spending of \$6.4 billion in the Medicaid budget for fiscal year (FY) 1995-96, which begins on April 1, 1995. By FY 1996-97, when the proposed cuts are fully phased in, state savings are estimated to grow to \$1.6 billion. When local and federal Medicaid matching funds are also taken into account, the overall reduction in Medicaid spending would be \$3.6 billion in FY 1995-96 and \$5.1 billion in FY 1996-97. This study was commissioned to assess the net economic impact of the proposed Medicaid cuts.

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Predicting Regional Economic Impact of Changes in National Policy

Changes in economic policy at the national level can influence a sub-national area through their effect on the national economy as a whole or through their relative and direct effects on the region or regions being analyzed. In the first case, it is always necessary to perform a national simulation as part of carrying out regional analyses. In the second case, it is only necessary to carry out the national simulation if the reverberation of the policy on the nation as a whole creates significant feedbacks for the sub-national area in question.

With major shifts in policy high on the national agenda, interest in looking at the effects of these policies on local economies is likely to continue to grow. The fact that some of the proposed policy changes would lead to a devolution of federal responsibilities to the states means that considerations, such as interstate competitive effects, will now become part of the policy analysis process. REMI models are available at the regional, national, as well as multi-regional U.S. levels in order to be able to answer any type of policy question. Use of the regional model alone is sufficient when comparing regional options, looking at state and local initiatives, or for exogenous events that affect a region only and that is small relative to the U.S. A national model plus a regional model, or a multi-regional U.S. model is necessary if you want to know the net effect of the policy on the region, the effect on the U.S. and/or regions of the U.S., or if you want to look at the regional effects of alternative U.S. forecasts.

Since local economies in an open system where money flows freely from one area to another generally share a common interest rate, the REMI regional models have a local cost of capital but do not include an endogenous interest rate. However, at the national level the monetary system must become endogenous. Specifically, the reactions of the Federal Reserve system to changes in the unemployment rate (and its consequences for inflation) must also be endogenous. An interest-rate response has been incorporated into the REMI national models that brings the economy close to its control path



Related Articles

"Employment Implications of Declining Tobacco Product Sales for the Regional Economies of the United States," by Kenneth E. Warner, George A. Fult n, Peter Nicolas, and Donald R. Grimes, *The Journal of the American Medical Association*, Vol. 275, 1241-1246 (April 24, 1996).

Summary:

The objective of this study is to determine whether declines in tobacco product sales significantly reduce employment in the United States, as the tobacco industry claims. Computer simulation of the economies of the Southeast Tobacco region and 8 non-tobacco regions of the United States, with domestic tobacco expenditures eliminated or reduced and the equivalent spending redistributed, according to consumers' normal spending patterns. We compared these results with baseline forecasts of the regional economies that include normal tobacco expenditures. Had there been no spending on tobacco products in the United States in 1993, the Southeast Tobacco region would have had 303,000 fewer jobs. Collectively, however, the 8 non-tobacco regions would have gained enough employment to completely offset losses in the Southeast Tobacco region, with every non-tobacco region gaining jobs. By the

by the fourth year after a policy stimulus. In addition to this default response, which reflects the historically observed U.S. unemployment response, two other options are provided to the user. The first assumes that the Federal Reserve cooperates fully and takes anticipatory action to completely offset the unemployment effects of any policy change, even in the first year. Under the second option, the typical Keynesian assumptions are made. There is no interest rate response and thus a policy may have a long-run effect on the unemployment rate.

year 2000, the absence of tobacco spending would mean a loss of 222,000 jobs in the Southeast Tobacco region, but a gain of 355,000 throughout the rest of the country. In the more realistic scenario of doubling the downward trend in tobacco consumption, the Southeast Tobacco region would lose 6300 jobs in 1993 (0.03% of regional employment) and 36,600 jobs by 2000 (0.2%). The 8 non-tobacco regions would gain 6400 jobs in 1993 and 56,300 jobs in 2000, with each of the non-tobacco regions gaining employment in every year. Contrary to the tobacco industry's claims, reductions in spending on tobacco products will boost employment in every one of the 8 non-tobacco regions and will not diminish employment in the Southeast Tobacco region by as much as the industry estimates. The primary concern about tobacco should be the enormity of its toll on health and not its impact on employment.

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"The Economic Impact of the Domestic Automotive Industry on the United States and Its Major Regions," by George A. Fulton and Donald R. Grimes, prepared for the U.S. Department of Commerce, Economic Development Administration, Technical Assistance and Research Division, September 1993.

Summary:

In this study, the economic impact of domestic automotive activity is assessed, both for the United States in total and by major economic region. The study provides quantitative estimates of the effect on the regional economies of an increase in the share of motor vehicle sales accounted for by domestic producers. The estimates include not only direct effects within the industry itself, but also spin-off effects across other industries from increased purchases by domestic suppliers and additional purchasing activities of consumers and

business. Also presented are historical statistics on the structure of the regional economies, and changes in this structure since the late 1970s. Two sets of experiments are carried out in the study, using two different theoretical models. The first is a short-run disequilibrium model, which assumes that there is enough unemployed labor in the United States to absorb the increase in auto activity without a reduction in employment in other sectors of the economy. An increase in production of 500,000 vehicles per year generates 119,094 private sector jobs in the U.S. economy, including 15,336 direct auto jobs and 103,758 spin-off jobs. The benefits of the impact are realized across many industry divisions, including non-manufacturing; all regions benefit to some extent. The second set of experiments is based on a long-run general equilibrium model, where any increase in employment caused by an increase in domestic motor vehicle production is assumed to be offset by a decrease in employment in other sectors. In the experiments chosen for the study, the structural change in the U.S. economy increases national income. The job and income effects vary greatly by region, with some regions gaining and others losing. The study is intended to improve our understanding of the auto industry's role in the regional economies, and of the potential effect of policy that alters that role.

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Modeling and Forecasting Transportation Infrastructure Investments with REMI



Related Articles

The direct effects of transportation infrastructure investments fall into various categories. The key categories are as follows:

1. **construction and construction financing effects;**
2. **operating effects;**
3. **environmental effects;**
4. **tourism effects;**
5. **cost savings for businesses; and**
6. **cost savings (including safety improvements) for consumers and commuters.**

The construction effects are handled in a straightforward manner by inputting the specific spending for the types of construction involved. The construction financing effects are addressed by changing appropriate tax rates or reducing alternative government expenditures by the appropriate amounts.

The operating effects are of significance for public transportation facilities. These are input into the model by increasing employment in the appropriate sector, reducing consumer expenditures on other types of transportation, and increasing taxes to pay subsidies.

The environmental effects apply mainly to substituting public transportation for private automobile transportation and are considered in the environmental section below.

Tourism effects are discussed in the economic development section above.

The effect of the improved roads is to reduce trucking costs. This reduction is accomplished by increasing productivity in the trucking industry in the model. In addition, productivity gains should also be introduced for industries that supply their own trucking. Transportation improvements that lead to reduced costs will reduce sales prices for regional industries. These

"Measuring Economic Development Benefits for Highway Decision-making: The Wisconsin Case," by Glen E. Weisbrod and James Beckwith, Transportation Quarterly, Vol. 46, No. 1, 57-79 (January 1992).

Summary:

This article examines issues involved in measuring and evaluating economic development impacts of major highway investment, and application of those findings for investment decision-making. It focuses on a proposed highway construction project to create a 200 mile four-lane highway across North-Central Wisconsin. This corridor would provide a major east-west link from Green Bay and Appleton on the east to Eau Claire and Chippewa Falls to the west where the route intersects with I-94 and continues on to Minnesota. The study evaluated five alternative levels of improvement for the Highway 29/45/10 Corridor, ranging from a two-lane arterial to a full freeway. A major motivation for considering the highway improvement was the belief, promoted by community and business leaders, that a high-quality four-lane highway connecting cities across the corridor could significantly enhance economic growth in the region. It was generally felt that unless highway improvements to the

reductions will be appropriately transmitted through the model. However, transportation cost reductions that directly reduce sales prices are different than other price reductions. They apply equally to competing imports to the extent that they reduce costs for imports. Therefore, the competitive response in the model for regional industries that increases local market shares when there are reductions in sales prices must be offset by appropriate reductions in the market share when these decreases stem directly from reduced transportation costs.

The savings to automobile users is a reduction in cost (less commuting time) or increase in benefits (safer travel) that will not be reflected by price indexes. Therefore, it should be treated as an amenity gain, and the amenity term in the migration equation should be adjusted by an amount that reflects the dollar value of non-pecuniary gains. This will increase the net number of migrants into the area, and have ramifications in the labor market and the rest of the model.

If a primary goal is to use transportation infrastructure improvements to foster economic development, then the increase in the variable of interest (e.g., employment, real disposable income, or real per capita income for current residents) per dollar of cost would be the appropriate measure for evaluating competing projects.

corridor were evaluated in terms of long-range economic development potential, the benefits of the corridor improvement would be underestimated. At the state level, there was also interest in using transportation investments to promote economic development objectives. The Wisconsin Department of Transportation was very interested in expanding its cost-benefit analysis to include not only benefits to the user, but also benefits to the economy. Accordingly, the department commissioned a study to assess potential long-term economic development benefits of building a new major four-lane facility across the state. The most notable aspect of this study is its breadth. The analysis process included an integrated set of simulation and forecasting models of the economy and the transportation network to evaluate potential impacts of this major highway investment. In addition to projecting benefits to auto travelers, the study focused on estimating impacts on expansion of existing business, attraction of new business, and tourism growth. Specific attention focused on providing a rigorous framework for benefit assessment that avoids double counting, a typical problem of economic impact assessment. In addition, attention was given to providing a methodology for estimating transportation and economic impacts that adequately recognizes implications of business efficiency benefits, a shortcoming of some prior economic assessment studies. This article provides an overview of how economic impacts were measured, describes the analysis modeling techniques used and shows how benefit-cost analysis was applied for highway investment decision-making.

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"Estimating the Economic Impacts of a Hub Airline Serving a Tourist Destination: The Case of America West Airlines and Las Vegas, Nevada," by John H. Brown, Thomas M. Carroll, Dan S. Rickman, and R. Keith

Schwer, International Journal of Public Administration, 18(1), 167-182 (1995).

Summary:

Airlines are an important component of regional economies. The economic impact of an airline goes beyond the usual impacts of their payroll and expenditures. Airlines also may affect business productivity and the critical economic base of a regional economy. This article estimates the economic impact of America West Airlines on Las Vegas, Nevada. Key aspects of the study were measurement of the direct impacts, estimation of the associated impact on tourism allowing for the possibility of competing travel alternatives, and the use of a regional economic impact model to derive the total economic impact.

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"Economic Impact and Benefit/Cost of High Speed Rail for California," by Economic Research Associates, submitted to California Intercity High Speed Rail Commission, September, 1996.

Summary:

This study compared the overall and component economic impacts of two high-speed rail alternatives, the very high-speed steel wheel alternative and the maglev alternative, on the California economy. In addition, the study examined the benefit versus cost relationship of the two HSR alternatives and evaluated station area development, land value impacts and social equity issues.

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Examined 450 files	
1	727: Canadian Newspapers_1990-2004/Jan 09
Examined 500 files	
1	781: ProQuest Newsstand_1998-2004/Jan 09
Examined 550 files	
2	992: NewsRoom Current_2003/Sep 30
4	993: NewsRoom 2002
1	994: NewsRoom 2001

20 files have one or more items; file list includes 555 files.

Set	Items	Description
S1	35	E()REMI
S2	21	RD (unique items)
S3	5	S2 AND REGIONAL()ECONOMIC
S4	4	S3 AND PY<=2000 <i>omit</i>
File	5:	Biosis Previews(R) 1969-2004/Jan W1 (c) 2004 BIOSIS
File	16:	Gale Group PROMT(R) 1990-2004/Jan 09 (c) 2004 The Gale Group
File	20:	Dialog Global Reporter 1997-2004/Jan 09 (c) 2004 The Dialog Corp.
File	116:	Brands & Their Companies 2003/Sep (c) 2003 Gale Research Inc.
File	148:	Gale Group Trade & Industry DB 1976-2004/Jan 09 (c)2004 The Gale Group
File	225:	DIALOG(R):Domain Names (c) 2003 Dialog & SnapNames.
File	261:	UPI News 1999-2004/Jan 09 (c) 2004 United Press International
File	319:	Chem Bus NewsBase 1984-2004/Jan 09 (c) 2004 Elsevier Eng. Info. Inc.
File	345:	Inpadoc/Fam.& Legal Stat 1968-2003/UD=200401 (c) 2004 EPO
File	416:	DIALOG COMPANY NAME FINDER(TM) 2003/MAR (c) 2003 DIALOG INFO.SVCS.
File	523:	D & B-European Financial Records 2003/Nov (Copr. 2002·D&B)
File	613:	PR Newswire 1999-2004/Jan 09 (c) 2004 PR Newswire Association Inc
File	619:	Asia Intelligence Wire 1995-2004/Jan 08 (c) 2004 Fin. Times Ltd
File	621:	Gale Group New Prod.Annou.(R) 1985-2004/Jan 09 (c) 2004 The Gale Group
File	649:	Gale Group Newswire ASAP(TM) 2004/Jan 01 (c) 2004 The Gale Group
File	727:	Canadian Newspapers 1990-2004/Jan 09 (c) 2004 Southam Inc.
File	781:	ProQuest Newsstand 1998-2004/Jan 09 (c) 2004 ProQuest Info&Learning
File	992:	NewsRoom Current 2003/Sep 30 (c) 2004 The Dialog Corporation
File	993:	NewsRoom 2002 (c) 2004 The Dialog Corporation
File	994:	NewsRoom 2001 (c) 2004 The Dialog Corporation